University of Groningen

Central bank independence and political pressure in the Greenspan era

Kuper, Gerard; Veurink, Jan Hessel

university of groningen / faculty of economics and business

14020-EEF

Central Bank Independence and Political Pressure in the Greenspan Era.

Gerard H. Kuper
Jan Hessel Veurink

SOM is the research institute of the Faculty of Economics & Business at the University of Groningen. SOM has six programmes:

- Economics, Econometrics and Finance
- Global Economics & Management
- Human Resource Management & Organizational Behaviour
- Innovation & Organization
- Marketing
- Operations Management & Operations Research

Research Institute SOM
Faculty of Economics & Business
University of Groningen

Visiting address:
Nettelbosje 2
9747 AE Groningen
The Netherlands

Postal address:
P.O. Box 800
9700 AV   Groningen
The Netherlands

T +31 50 363 7068/3815

www.rug.nl/feb/research

Central Bank Independence and Political Pressure in the Greenspan Era

Gerard H. Kuper
Faculty of Economics and Business, University of Groningen

Jan Hessel Veurink
Faculty of Economics and Business, University of Groningen

Central Bank Independence and Political Pressure in the Greenspan Era

Gerard H. Kuper[a] and Jan Hessel Veurink[b]

July 2014

Abstract: This paper investigates whether political pressure from incumbent presidents influences the Fed's monetary policy during the period that Alan Greenspan was the chairman of the United States Federal Reserve Board. A modified Taylor rule - featuring the inflation rate and the unemployment gap rather than the output gap - with time-varying coefficients will be used to test well-known political-economic theories of Nordhaus (1975) and Hibbs (1987). This novel approach addresses some of the disadvantages of Ordinary Least Squares, and has the additional benefit of allowing the use of mixed frequency data. Our findings suggest that the Fed under Greenspan did not create election driven monetary cycles, but was less inflation avers with a Democratic president.

Keywords: Taylor rule, political business cycles, state space, time-varying coefficients
JEL classifications: E42, E47, E58

---

[a] Corresponding author: G.H. Kuper, Department of Economics, Econometrics and Finance, University of Groningen, PO Box 800, 9700 AV Groningen, The Netherlands, email: g.h.kuper@rug.nl, tel. +31 50 3633756, fax. +31 50 3637337.

[b] MSc Economics student at the VU University, Amsterdam.

1. Introduction

In the recent years, economists and policy makers have shown interest in independent central banks and their monetary policy, and a number of countries increased the legal independence of their central banks. There are several reasons for the trend towards more independence of central banks since the breakdown of the Bretton Woods system. Especially the success of the independent Bundesbank led to the belief that independence of the central bank is a useful devise to maintain price stability. Furthermore, the Maastricht Treaty requires that having an independent central bank is a condition for entering the Economic and Monetary Union. Also for former socialist countries an independent central bank is a good start for a well-functioning market economy.

Central bank independence seems beneficial in the long run. However, policy makers could have other objectives. Kiewiet and Rivers (1984) find a relationship between the actual economic performance of a country and upcoming elections. The authors claim that voters are more likely to support the incumbent party when the economic situation is more favorable. Consequently, politicians might try to influence the behavior of the central bank.

In this paper we focus on the period in which the Fed was chaired by Greenspan. In this period some authors argue that Greenspan, and also other central bankers, departed from a strict or rules-based monetary policy rule because of favourable or less favourable economic circumstances. For instance Cargill and O'Driscoll (2012) argues that interest rates lower than predicted by the Taylor rule contributed to the run-up of real estate prices, the burst of the US bubble economy and subsequent international financial crisis in late 2008 and early 2009. Also more recently central banks are not free of political pressure, because to resolve the global financial crisis pressure increased on central banks to shift to an activist policy to support fiscal imbalances and prop up troubled financial institutions.

This paper investigates whether political pressure from the incumbent has had an effect on monetary policy in the United States in the period August 1987 until and including January 2006. Cargill and O'Driscoll (2013) concludes that Fed's emphasis on the short run inevitably subjects them to political pressure. We develop a modified Taylor rule and test the two main theoretical findings of political influence on macroeconomic policy from Nordhaus (1975) and Hibbs (1987) which will be reviewed in the next section. We present the econometric model of the Taylor rule in Section 3. In this section we also discuss how we test our hypothesis related to political pressure. The data is presented in Section 4. Section 5 discussed our results. In Section 6 we test whether there is political pressure on the Fed. We complete the paper with our main conclusion in Section 7.

2. Literature review

The time inconsistency, or dynamic inconsistency, problem is the main theoretical driver for central bank independence. Time inconsistency in economics occurs when a present plan is optimal for a future period but is actually suboptimal when the future period starts. The most prominent models, based on game theory, of the dynamic inconsistency approach are from Kydland and Prescott (1997) and Barro and Gordon (1983). Their conclusion is almost universally that the dynamic inconsistency problem leads to a bias towards higher inflation. As a result Rogoff (1985) concludes that the central bank's objective function should reflect stronger inflation aversion than the objective function of the society. In other words, society is better off by appointing a conservative central banker that has a different objective function then the social welfare function. This makes central bank independence theoretically a preferred option. Note however that there is a discussion what central bank independence is, and whether it is a necessary condition for price stability. Taylor (2013) concludes that formal independence without policy rules does not generate good policy outcomes. We refer to Hayo and Hefeker (2002) for a critical review of the literature.

The literature on time inconsistency and central bank independence focuses on price stability as a prerequisite for growth. However, the relationship between inflation and economic growth is complex, but most economists agree that inflation negatively influences economic growth due to for instance uncertainty in the markets, menu costs and disinflation costs. This is supported by early empirical research of Fischer (1993) and Barro (1998). Alesina and Summer (1993), Grilli et al. (1991), and Cukierman et al. (1992) conclude that central bank independence is negatively correlated with inflation. For a survey of we refer to Temple (2000). Although these results suggest that central bank independence has positive effects on real economic performance, the empirical results are not clear-cut. Both Alesina and Summers (1993) and Cukierman et al. (1993) do not find any relationship between real economic variables and legal central bank independence.

We focus in this paper on political pressure on monetary and fiscal authorities. Barro and Gordon (1983) argue that when monetary rules are in place, every period the policy maker is tempted to cheat on the monetary rules in order to benefit from inflation shocks. A politician wants to engage in monetary policy and fiscal policy in order to satisfy his own or his constituents' preferences instead of choosing the optimal solution for society. One of the possible arguments for choosing a suboptimal solution is mentioned by Nordhaus (1975), who argues that politicians only care about staying in the office. The main supporting assumption of his model is that voters are not forward looking and do not have any memory and therefore can be systematically fooled. Nordhaus' (1975) model led to the creation of a political business cycle (PBC), where the incumbent reduces unemployment before the elections by stimulating the economy and will fight inflation right after the economy by causing a recession. Although the outcomes of this model became quite famous, the main critique is based on the assumption that voters are not rational. However, by including rational voters Cukierman and Meltzer (1986) and Rogoff and Sibert (1988) arrived at similar conclusions. In Rogoff and Sibert (1988) the incomplete information of voters on the competence of policy makers caused the cycle, while in Cukierman and Meltzer (1986) policymakers and voters have different information about shocks. However, in many econometric studies on PCB's such as Alesina et al. (1997) and Faust and Irons (1999) there is little support for increasing economic activity prior to elections in the United States.

There is also a different view on why politicians would like to deviate from the optimal solution. Hibbs (1987) argues that there are ideological differences between parties and this will lead to partisan politics creation partisan macroeconomic cycles. For the United States, his main assumption was that Democratic voters are poor and laborers, while the Republican voters are rich and capitalists. In addition, he claims that expansionary fiscal and monetary policy will lead to income redistribution from the rich to the poor. Therefore, Hibbs concludes that the Democrats would be more tolerant to higher inflation rates, while the Republicans would be more inflation averse. Alesina (1987) models the partisan approach of Hibbs (1987) in a rational world, where elections create uncertainty because the rational economic agents do not know which party will win. As a result, this model predicts only differences at the beginning of the term in office of the new party. In the case of the United States, it predicts that if the Republicans win the election there will be low money growth and a recession while economic growth and high money growth will be observed when the Democrats win the election. Alesina and Sachs (1988) empirically confirm the findings of Alesina (1987).

Most empirical research about the PBC and the partisan approach have focused on both monetary as fiscal policy. However, the fiscal authority is shared between the incumbent and the congress in the United States and the president has little influence in the congress. As a result, it is difficult for the president to manipulate the economy with fiscal policy. Therefore, the literature focuses on political monetary cycles. In the early search for political monetary cycles - explained by electorally motivated incumbents as in the Nordhaus (1975) model - McCallum (1978), Beck (1984) and Havrilesky (1987) find no evidence for political monetary cycles, while Grier (1984) did find a political monetary cycle by looking at M1. The latter result is confirmed by Beck (1987). However, Beck (1987) argues that there could be a political cycle in M1, which is not created by the Fed because M1 is not under direct control of the Fed. In other words, M1 is an endogenous variable. He suggests to look at the instruments of the Fed such as the federal funds rate to find evidence for a political monetary cycle. In those instruments, he does not find a political cycle. Nevertheless, Grier (1989) who controls for GNP, interest rates and budget deficits does find a cycle in M1. The empirical evidence on the opportunistic political monetary cycles thus has obtained mixed results, so Grier (1989) concludes that the '*case is not closed.'* A recent paper by Abrams and Iossifov (2006) does find a political monetary cycle in the federal funds rate when the president and the chairman of the Fed share the same partisan affiliation.

Although the election driven monetary cycles gave mixed results, there is more positive empirical evidence for the partisan theory. Chappell et al. (1993) finds that the presidents exerted their partisan's influences in the Presidential appointments with the Federal Open Market Committee (FOMC). Democrats' appointees of the FOMC are less tight in monetary policy making then Republicans making the Presidential appointments a channel to influence their partisan affiliations. Moreover, Chappell and Keech (1986) find that the money growth is systematically higher under Democratic presidents, which means that Democrats care less about inflation. Furthermore, Caporale and Grier (1998) state that with Republican presidents there is significantly tighter monetary policy. In accordance to Caporale and Grier (1998), Corder (2006) claims that with a backward-looking Taylor rule the Fed is more an inflation fighter with Republicans in the White House. To conclude, it seems that the President still has partisan influence on Fed decision-making based on previous empirical studies.

As a final remark we note that both Abrams and Iossifov (2006) and Corder (2006) test the theories of political pressure of the Fed by a Taylor rule, which will also be used in this paper. In a comment Tempelman (2007) argues that the time period (1954-2004) in the paper of Abrams and Iossifov (2006) is too long obscuring trends like the improvement in monetary policy over the last 30 years. We also use a relatively short time period (1987-2006), but unlike Corder (2006) and Abrams and Iossifov (2006) we use a forward-looking model. More details on our Taylor specification will be given in the next section.

3. Economic model

3.1 Time-varying Taylor rule

To test the political monetary cycle theory and the partisan theory we use a time-varying version of a modified Taylor rule model for Fed's behavior. The standard rule from Taylor (1993) can be written as the following linear equation:

$$i_t = \pi_t + r^* + \alpha(\pi_t - \pi^*) + \beta(y_t - y_t^*) \quad (1)$$

Here, i_t represents the nominal short term interest rate, π_t is the inflation rate, r^* is the equilibrium real interest rate, π^* is the target level of the inflation rate, y_t is the natural logarithm of GDP, y_t^* is the natural logarithm of potential GDP. The difference between the loglevel of GDP and the loglevel of potential GDP is the output gap. The coefficients α and β measure the reaction of the Fed when inflation and output deviates from the target inflation rate and potential GDP, respectively. Both α and β are positive (Taylor, 1993 proposes $\alpha = 0.5; \beta = 0.5$). The rational is that when the inflation exceeds its target or when the output gap is positive, the nominal interest rate has to be increased in order to reduce the inflationary pressure. If the opposite occurs the rule recommends a lower nominal short term interest rate in order to stimulate consumption and investment.

Although Taylor (1993) shows that the rule describes the federal funds rate quite accurate in the period 1987-1992, there are some arguments why the rule might not accurately describe the behaviour of a central bank. First of all, the main two objectives of the Fed, referred as the FOMC's dual mandate, are full employment and price stability. Therefore, the output gap might be less relevant for the Fed than the unemployment gap. Secondly, Svensson (2003) states that even if the central bank's objective is to stabilize inflation and output a simple Taylor rule will be suboptimal. The reason is that the impact of interest rate changes on inflation and output (or unemployment) comes with a lag. Therefore, Svensson (2003) argues that the value of the instrument has to be set consistently with the inflation target and output forecasts allowing the use of judgement and what he calls extra-model information. In other words, the central bank's behaviour should be forward looking. Besides this theoretical argument there is also a practical argument, namely that actual inflation and the output are not known when the Fed sets its federal funds rate target. As a result, the rule should be based on expected inflation and output instead of the realized values.

In order to deal with the two mentioned issues in the empirical model, the output gap will be replaced for the unemployment gap (using Okun's Law) and we substitute the realized values of the explanatory variables for the expected values. Despite that this rule is forward looking and includes the FOMC's dual mandate; it still misses a well observed behaviour of the Fed which is commonly known as interest rate smoothing. Interest rate smoothing reduces the variability of interest rate change. Following Sack and Wieland (2000), the main reasons for interest rate smoothing are to avoid measurement errors in real time data of key macroeconomic variables, reduce uncertainty about outcomes of relevant structural parameters, and facilitate the forward looking expectations of agents in the market. Additional, Woodford (1999) claims that interest rate smoothing is one of the conditions in order to achieve optimal monetary policy. Although interest rate smoothing is widely accepted, the standard Taylor rule does not include this. One way to include interest rate smoothing, which is also done among others by Clarida et al. (2000) and Woodford (1999), is to weigh the lagged variable and the interest rate target. In mathematical way it can be written as a partial adjustment model:

$$i_t = \theta i_{t-1} + (1-\theta) i_t^* \quad (2)$$

$$i_t^* = c_0 + \alpha(E_t \pi_{t+1} - \pi^*) + \beta(E_t u_{t+1} - E_t u_{t+1}^*) \quad (3)$$

Here i_t is the actual federal funds rate, i_{t-1} is the lagged federal funds rate, and i_t^* is the federal funds rate target based on the modified Taylor rule shown by Equation (3). In addition, θ measures the degree of interest rate smoothing. When θ is relatively high, the Fed tends set the new federal funds rate relatively close to the lagged federal funds rate and therefore the degree of interest rate smoothing is high. Moreover, the opposite shows that the degree of interest rate smoothing is relatively low. According to Rudebusch (2002) most values of θ are in the range of 0.8. In addition, Kim and Nelson (2006) use a time-varying model also find an θ around 0.8 in the period 1970-2001. In the partial adjustment model the errors are serially correlated which biases the LS standard errors. So, we take a different approach instead and model policy inertia by applying Generalized Least Squares (GLS) with AR(1)-coefficient ρ, and time-varying weights:

$$i_t = \rho i_{t-1} + c_0(1-\rho) + \alpha_t[(E_t \pi_{t+1} - \pi^*) - \rho(E_{t-1}\pi_t - \pi^*)] + \beta_t[(E_t u_{t+1} - E_t u_{t+1}^*) - \rho(E_{t-1}u_t - E_{t-1}u_t^*)] + \varepsilon_t \quad (4)$$

The reason for time-varying weights is that we will obtain the coefficients α and β as a time series, which is helpful to test the political pressure theories of Hibbs (1987) and Nordhaus (1975). In order to make the coefficients α and β time-varying, a state space model with the Kalman filter will be used. State space models mainly have two useful applications for macroeconomic. Firstly, it can identify unobserved variables, such as natural rate of unemployment or the potential level of output. Secondly, it can be used to make coefficients time-varying. Our state space model representation consists of Equation (4) above completed with:

$$\alpha_t = \alpha_{t-1} + \varepsilon_t^\alpha \quad (5)$$

$$\beta_t = \beta_{t-1} + \varepsilon_t^\beta \quad (6)$$

Equation (4) represents the Fed's interest rate policy where ε_t is the error term, and where i_t is called the signal variable. In addition Equations (5) and (6) model α_t and β_t as stochastic processes with error terms ε_t^{α} and ε_t^{β}. Different stochastic processes can been chosen for the state variables, we choose random walk processes without drift that allow for slowly evolving weights in the Taylor rule.

The main feature of a state space model is the Kalman filter (Kalman, 1960). In short, the Kalman filter basically predicts the value of the future state variable (α_t and β_t) based on the information given at the previous period t-1. After this the Kalman filter updates the predicted estimates when the value of the signal variable (i_t) is known and gives a filtered estimate of the state variables (α_t and β_t). This will be an iterative process until the end of the sample. After that it will give a smoothed estimated which are calculated on the whole information set by backward calculations, so it estimates the state value at time t-1 based on the information of the state and signal variables given at time t which is obtained by the iterative process described before. Thus, most information is contained in the smoothed estimates, which will be used in our approach. One additional beneficial feature of the Kalman filter is that it can be used with different frequencies of the data in the states variables. Therefore, the monthly expectations of inflation and the quarterly expectations of the unemployment rate can be used.

The inflation target of the Fed will be assumed to be 2% over the entire period. This assumption is in accordance with Taylor (1993). Although Fed's inflation targets may vary over time due to different economic circumstances, the target of 2% may be the ideal value of the Fed, and therefore a reasonable assumption.

3.2 Political pressure

After obtaining the smoothed time series of α_t and β_t by using the Kalman filter, we test the political monetary cycle theory and the partisan theory. As already mentioned, the political monetary cycle is based the concept of an economic boost before the election and a recession after the election with no difference with respect to the partisan affiliation of the incumbent. In order to test this theory we add three election (0,1) dummies: an election dummy (*E*), a before-election dummy (*B*), and an after-election dummy (A). In the next section we discuss how we construct the dummy variables. Following the theory, an economic boost before the election would let the Fed react less to inflation and more to the unemployment gap. On the other hand, after the elections the Fed should be less responsive to the unemployment gap and be more inflation averse.

To test the partisan theory we construct a partisan-dummy P with the value of 1 when a Democrat is in the office while it will be 0 when a Republican is in charge. The partisan theory describes that Republicans are more inflation avers while the Democrats care more about unemployment. These tests will reveal whether there is significant pressure of the incumbent on the Fed to change their behaviour toward the federal funds rate. However, when the Fed is completely independent from the White house both theories should be rejected. The equations to test these theories are:

$$\Delta\alpha_t = c_1 + c_2 B + c_3 E + c_4 A + c_5 P + v_t^{\alpha} \tag{7}$$

$$\Delta\beta_t = c_6 + c_7 B + c_8 E + c_9 A + c_{10} P + v_t^{\beta} \tag{8}$$

Following the theory, an economic boost before the election would let the Fed react less to inflation and more to the unemployment gap. As a result, the coefficients c_2 and c_7 should be negative. On the other hand, after the elections the Fed should be less response for the unemployment gap and be more inflation averse. Hence, the coefficients c_4 and c_9 should be positive. The partisan theory describes that Republicans are more inflation avers while the Democrats care more about unemployment. Consequently, c_5 should be negative because Democrats are less inflation fighters and c_{10} should also negative because they react heavier to high unemployment.

4. Data

We are analysing political pressure for the period August 1987 until and including January 2006. In this period monetary policy has been well developed and the Fed was led by one chairman. Table 1 gives a description of the time series used in this paper.

Table 1. *Descriptions and sources of the time series.*

Series name	Description
FFR	Effective Federal Funds Rate Source: Board of Governors of the Federal Reserve System
EXI	Median expected price change next 12 months Source: Survey of the University of Michigan
EXU	Median 4-quarter ahead unemployment forecast (sequence of 5-step-ahead forecasts including current-quarter forecasts) Source: Survey of professional forecasters of the Federal Bank of Philadelphia

The definitions, samples, frequency, and sources of these series are in Appendix A. The effective federal funds rate is from the Board of Governors of the Federal Reserve System. These are annualized monthly averages based on daily figures. The survey of the University of Michigan has been used to obtain the expected yearly inflation rate for every month. The expected 12 month ahead inflation rate is less volatile than the actual annual inflation rate as is shown in Figure 1. The quarterly expected unemployment rate is from a survey of professional forecasters of the Federal Bank of Philadelphia. Figure 2 reveals that the expected 4-quarter ahead forecast of unemployment underestimates the peaks and troughs in the actual unemployment rate. These peaks and troughs in the actual unemployment rate for the US correspond closely to the peaks (July 1990 and March 2001) and troughs (March 1991 and November 2001) in the US business cycle as dated by the NBER.

Instead of assuming a constant natural unemployment rate of for instance 6%, we use the Hodrick-Prescott filter because the Fed might target a different rate under different economic circumstances. The quarterly expected unemployment rate is decomposed in a monthly trend component, which we interpret as the expected natural rate of unemployment, and a cyclical component using a state space approach of the Hodrick-Prescott filter using a wider sample (July 1954 until and including June 2013) to avoid the end-point bias. We denote by the *expected unemployment gap* the difference between the median 4-quarter ahead forecast (EXU) and the smoothed monthly trend component (EXUHPF) from the Hodrick-Prescott filter. Finally, the target level of the inflation is set at 2% annually, and the *expected inflation gap* is defined as the median expected price change in the next 12 months (EXI) minus 2. These constructed series are presented in Figure 3.

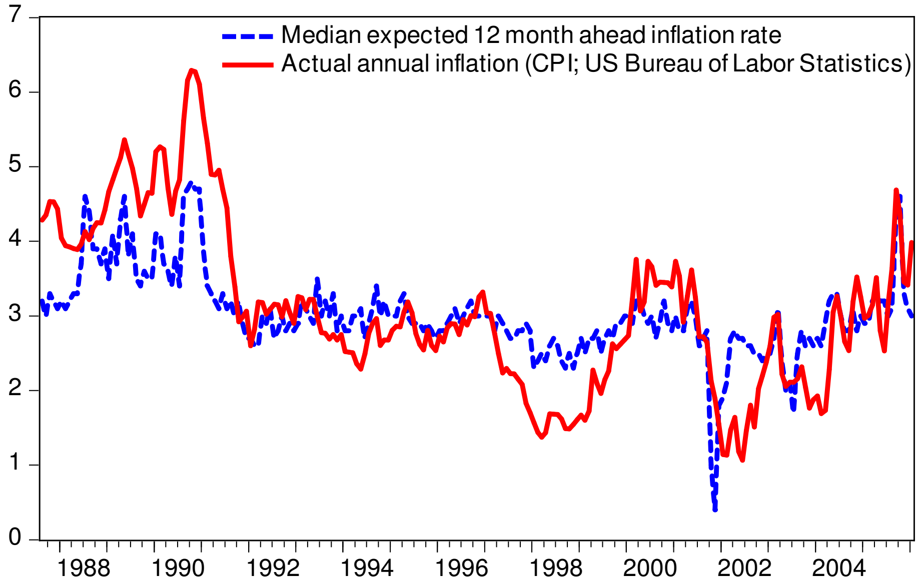

Figure 1. *The median expected 12 month ahead inflation rate and the actual annual inflation rate.*

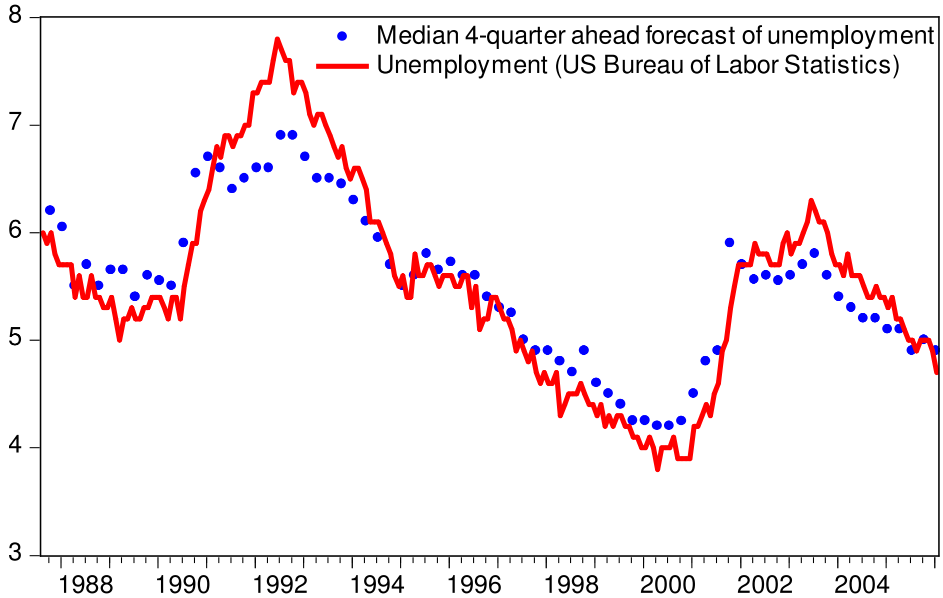

Figure 2. *The median expected 4-quarter ahead forecast of unemployment and the actual unemployment rate.*

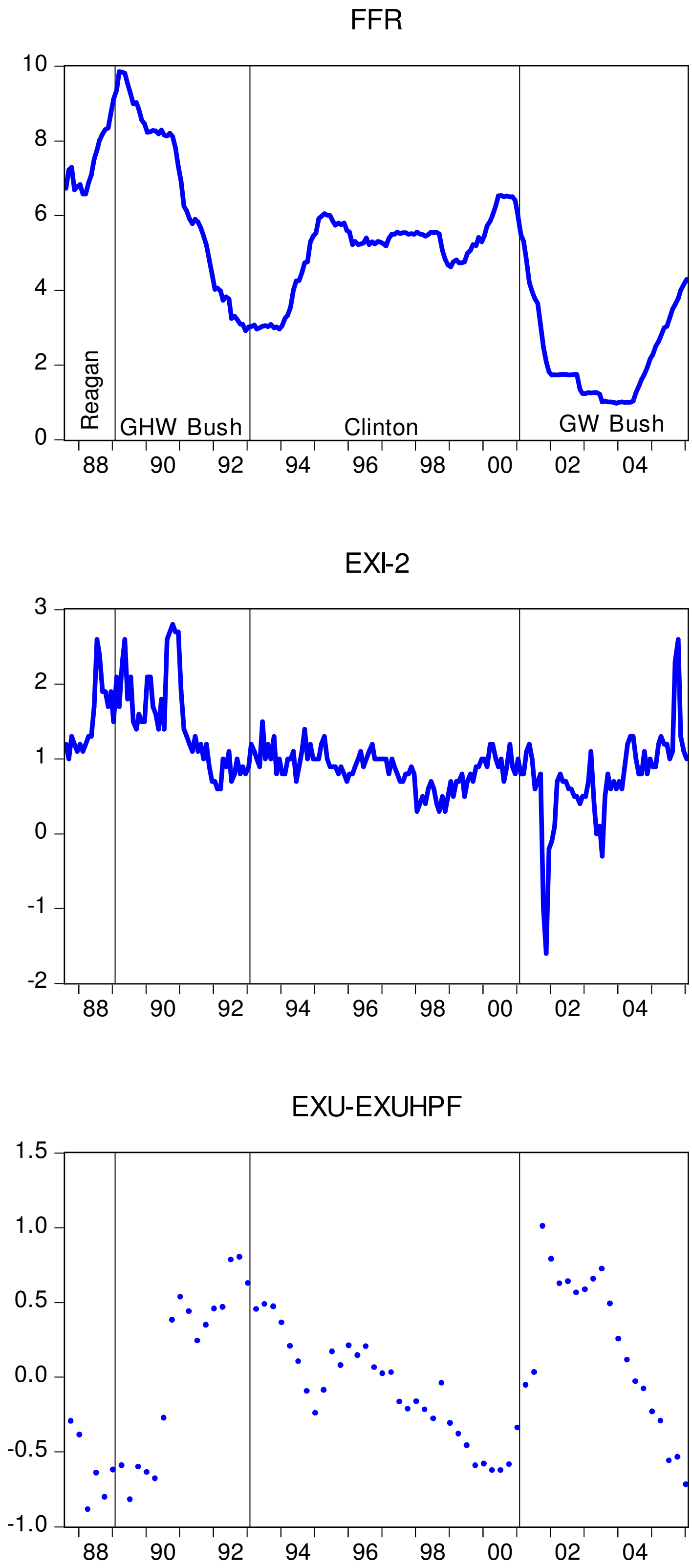

Figure 3. *The federal funds interest rate (FFR), the expected inflation rate minus the target inflation rate (EXI-2), and the expected unemployment rate minus the expected natural rate of unemployment (EXU-EXUHPF) for the period August 1987-January 2006.*

Instead of assuming a constant natural unemployment rate of for instance 6%, we use the Hodrick-Prescott filter because the Fed might target a different rate under different economic circumstances. The quarterly expected unemployment rate is decomposed in a monthly trend component, which we interpret as the expected natural rate of unemployment, and a cyclical component using a state space approach of the Hodrick-Prescott filter using a wider sample (July 1954 until and including June 2013) to avoid the end-point bias. We denote by the *expected unemployment gap* the difference between the median 4-quarter ahead forecast (EXU) and the smoothed monthly trend component (EXUHPF) from the Hodrick-Prescott filter. Finally, the target level of the inflation is set at 2% annually, and the *expected inflation gap* is defined as the median expected price change in the next 12 months (EXI) minus 2. The time series are illustrated in Figure 3.

In the analysis we focus exclusively on the Greenspan era: August 1987 until and including January 2006. In this period there were five elections with 8 years of Democrats (Clinton administrations, February 1993 – January 2001) and 10.5 years of Republicans in the office (Reagan, February 1981-January 1989; G.H.W. Bush, February 1989-January 1993; and G.W. Bush, February 2001-January 2009). Figure 3 illustrates that in the administration of G.H.W. Bush and the first administration of G.W. Bush the federal funds rate declined sharply. In the period 1999-2000 the interest rate was raised in six steps from 4.5% to 6.5%. However, over the period 2000-2001 the stock market dropped sharply, and as a response the Fed reduces the federal funds rate dramatically. In addition, the Fed kept the federal funds rate extremely low until 2004.

To test the political pressure hypotheses we construct dummy variables. The dummy variable P has a value of is 1 in the months in which the Democrats are in office and zeroes for Republicans. Furthermore, we constructed three (0,1) election dummy variables: E is 1 in the election month (November), and 0 elsewhere. B and A have ones in six months before, respectively after the elections, and 0 elsewhere. Obviously, six months is an arbitrary choice. However, we indicate below that different assumptions do not affect the results.

5. Results

The economic model given by Equations (4), (5), and (6) is estimated using maximum likelihood. We impose some assumptions on the model. The signal equation (4), and the state equations (5) and (6) all contain an error term. We include an error term in the signal equation so that the weights in the Taylor rule equation do not vary a lot. The underlying assumption is that central bank behaviour is not expected to be very erratic. We also assume that the covariance between the error terms is zero.[1] Furthermore, we set the coefficients at initial values. The initial values for the autocorrelation coefficient ρ and nominal target interest rate c_0 are set at 0.9 and 4, respectively. The autocorrelation coefficient is initially chosen close to the first-order autocorrelation coefficient of the federal funds rate. The initial value for the nominal target interest rate is based on an real interest rate of 2% and 2% inflation.[2] The specification of the error variances facilitate positive error variances.[3]

Table 2 shows the initial values for the coefficients and their estimates. The coefficients of the interest rate equation are significant at 5%, and the estimate for the autocorrelation coefficient is smaller than 1 (p-value = 0.011). The initial state vector $(\alpha_0, \beta_0)' = (0, 0)'$, and the final state vector $(\alpha, \beta)' = (0.023, -1.469)'$ with a final state covariance matrix $\begin{pmatrix} 0.051 & 0.002 \\ 0.002 & 0.399 \end{pmatrix}$.

Figure 4 displays the time series of the smoothed time-varying coefficients of the expected inflation gap and the expected unemployment gap (coefficients α_t and β_t) from August 1987 until January 2006. Figure 4 shows that signs of the coefficients are as expected, but the final state value of α_t is statistically not different from 0. It is also clear that the weight for the unemployment gap in the Taylor rule gradually

---

1 Allowing the covariance between the errors in the state equations to be non-zero results in the covariance to be not significantly different from zero, but the results differ.

2 The results are not very sensitive for the initial values. Only if the initial value for the autocorrelation coefficient is smaller than 0.25, the results differ, but the information criteria (Akaike and Schwarz) go up and the model is less informative.

3 Different initial values do not change the results.

increases until the start of the G.W. Bush administration. The weight on inflation gradually drops until 2001 which coincides with the end of the Internet bubble.

Table 2. *Estimates of the state space model (August 1987-January 2006).*

Model specification:

$$i_t = \rho i_{t-1} + c_0(1-\rho) + \alpha_t[(E_t\pi_{t+1} - \pi^*) - \rho(E_{t-1}\pi_t - \pi^*)] +$$
$$\beta_t[(E_t u_{t+1} - E_t u^*_{t+1}) - \rho(E_{t-1}u_t - E_{t-1}u^*_t)] + \varepsilon_t;$$
$$\alpha_t = \alpha_{t-1} + \varepsilon^\alpha_t; \beta_t = \beta_{t-1} + \varepsilon^\beta_t$$

Coefficient	Initial value	Estimate (se)
ρ	0.9	0.922 (0.031)
c_0	4	3.532 (1.097)
Error variances = exp(c)	Initial value for c	Estimate for c (se)
ε	-1	-1.116 (0.172)
ε^α	-1	-5.998 (1.976)
ε^β	-1	-5.301 (3.276)
	Final state	p-value
α	0.023	0.918
β	-1.469	0.020
Observations (quarterly)	74	
Log likelihood	-81.819	

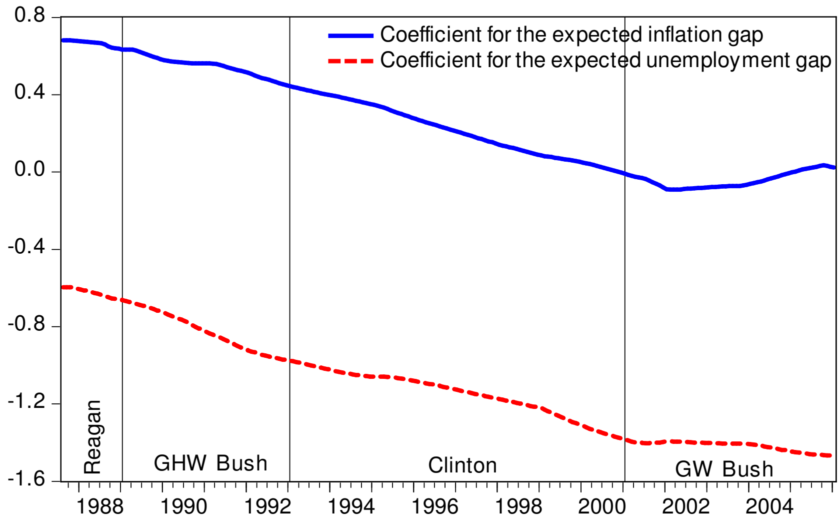

Figure 4. *The smoothed time-varying coefficients of the expected inflation gap and the expected unemployment gap.*

It may be informative to analyze the correlations between the federal funds rate, the expected unemployment gap, the expected inflation gap, the time-varying coefficient of the expected unemployment gap and the time-varying coefficient of the expected inflation gap. From Table 3 we conclude that the correlation between the expected inflation gap and the federal funds rate is positive, and the correlation between the expected unemployment gap and the federal funds rate is negative. This is what we expect: a higher inflation gap correlates with a higher federal funds rate, and a lower unemployment gap also correlates positively with federal funds rate.

Table 3. *Correlations between the federal funds rate (FFR), the expected unemployment gap (EXU-EXUHPF), the expected inflation gap (EXI-2), the time-varying coefficient of the expected inflation gap (α), and the time-varying coefficient of the expected unemployment gap (β) for the period August 1987-January 2006.*

	FFR	EXU-EXUHPF	EXI-2	State α	State β
FFR	1.000				
EXU-EXUHPF	-0.650	1.000			
EXI-2	0.619	-0.508	1.000		
State α	0.680	-0.179	-0.535	1.000	
State β	0.727	-0.209	-0.500	0.979	1.000

Table 3 also shows that the correlation between the coefficients of the gap-terms is strong and positive. One might expect the correlation to be negative if the policy consistently increases one coefficient while lowering the other. This is only observed for the G.W. Bush administration. Finally, the coefficients correlate positively with the federal funds rate.

The model is estimated until January 2006. Figure C1 in Appendix shows dynamic forecasts without using additional information about the federal funds rate, but with actual data on unemployment, trend unemployment and inflation gap. With the end-of-sample weights in the Taylor rule equation, the Taylor rule tracks the federal funds rate remarkably well until 2010. This forecast error is remarkably small since the forecast period includes the build-up of the US housing bubble, its burst, the ensuing credit crisis and the 2007-2009 recession in the United States. After 2010, the Taylor rule overestimates the federal funds rate by about 0.6%.

6. Political pressure

In this section we test the existence of the political monetary cycle and partisan affiliation for the period in which Greenspan served as Chairman of the Federal Reserve of the United States from August 1987 to January 2006.

The state variables α_t and β_t are assumed to be random walk processes with error terms ε_t^{α} and ε_t^{β}. The differences of these random walk processes are stationary variables which are used to test for impact of political pressure on the weights in the Taylor rule. We add election dummies to test for monetary cycles and a dummy for political affiliation of the incumbent president to test for partisan effects.

Table 4. *Estimates of political pressure (August 1987-January 2006).*

	$100\Delta\alpha_t = c_1 + c_2B + c_3E + c_4 + c_5P + v_t^{\alpha}$		$100\Delta\beta_t = c_6 + c_7B + c_8E + c_9A + c_{10}P + v_t^{\beta}$	
Variable	Coefficient	se	Coefficient	se
intercept	-0.185	0.033	-0.376	0.026
B (6 months)	-0.063	0.066	-0.083	
E	-0.035	0.148	0.019	0.116
A (6 months)	0.031	0.065	-0.000	0.051
P	-0.285	0.046	-0.021	0.036
Observations	221		221	
R-squared	0.154		0.013	

Table 4 shows that over the period August 1987 to January 2006 the weights in the Taylor rule gradually drop, this implies a stronger emphasis on reducing unemployment and less emphasis on reducing inflation. There is also evidence for a partisan effect. Under Democratic presidents the weight on the expected inflation gap drops considerably (-0.285), and this is statistically significant at 1% while the weight on expected unemployment in the Taylor rule does not depend on the political affiliation of the incumbent president. The dummies *B* and *A* reflect political pressure six months before and 6 months after the elections, respectively. Evidence for an election driven monetary cycle is absent since none of the dummies is statistically significant at conventional levels of significance. Using other dummies – single (0,1) dummies up to 12 months or dummies for different time spans – does not change this result.

7. Conclusion

In order to test for political pressure the Fed's reaction function is modeled for the period August 1987 to January 2006 by a modified time-varying Taylor rule specification. The coefficients of the expected inflation gap and the expected unemployment gap are made time-varying by using the Kalman filter in a state space setting.

The main political macroeconomic theories of an election driven monetary cycle and the partisan affiliation theory are tested, and we found no evidence for an opportunistic political monetary cycle. However, we did find evidence of an effect of partisan affiliation of the incumbent president. We show that the Fed has been less inflation avers when a Democrat president is in office.

There are some limitations of the study. First of all, the inflation target of 2% of the Fed may not be always representing the actual target. Secondly, there may be omitted variables such as financial stress indicators, which are not taken in account in the model explicitly. Finally, although state space models have clear advantages - which are stressed in this paper - there are disadvantages as well; there is a great variety of state space models formulations, and the outcomes may be sensitive to initial conditions. This flexibility is an advantage when used carefully. Another characteristic of state space models is that you have to have prior knowledge about the processes you are modeling.

References

Abrams, B. A. and P. Iossifov (2006), “Does the Fed Contribute to a Political Business Cycle?,” *Public Choice*, vol. 129(3), pp. 249-262.

Alesina, A. F. (1987), “Macroeconomic Policy in a Two-Party System as a Repeated Game,” *The Quarterly Journal of Economics*, vol. 102(3), pp. 651-678.

Alesina, A. and J. Sachs (1988), “Political Parties and the Business Cycle in the United States, 1948-1984,” *Journal of Money, Credit and Banking,* vol. 20(1), pp. 63-82.

Alesina, A. and L. H. Summers (1993), “Central Bank Independence and Macroeconomic Performance: Some Comparative Evidence,” *Journal of Money, Credit and Banking,* vol. 25(2), pp. 151-162.

Alesina, A., N. Roubini, and G. D. Cohen (1997), *Political Cycles and the Macroeconomy*, Cambridge Mass, The MIT Press, Cambridge MA.

Barro, R., (1998), *Determinants of Economic Growth: A Cross-Country Empirical Study*, The MIT Press, Cambridge MA.

Barro, R. and D. Gordon (1983), “Rules, discretion and reputation in a model of monetary policy,” *Journal of Monetary Economics*, vol. 12(1), pp. 101-121.

Beck, N. (1984), “Domestic Political Sources of American Monetary Policy: 1955-82,” *The Journal of Politics,* vol. 46(3), pp. 786-817.

Beck, N. (1987), “Elections and the Fed: Is There a Political Monetary Cycle?,” *American Journal of Political Science*, vol. 31(1), pp. 194-216.

Caporale, T. and K. B. Grier (1998), “A Political Model of Monetary Policy with Application to the Real Fed Funds Rate,” *Journal of Law and Economics*, vol. 41(2), pp. 409-428.

Cargill, T. F. and G. P. O’Driscoll (2012). “Measuring Central Bank Independence, Policy Implications, and Federal Reserve Independence,” Paper presented at the American Economic Association.

Cargill, T. F. and G. P. O’Driscoll (2013). “Federal Reserve Independence: Reality or Myth?,” *Cato Journal*, vol. 33(3), pp. 417-435.

Chappell, H. W., T. M. Havrilesky, and R. R. McGregor (1993), “Partisan Monetary Policies: Presidential Influence through the Power of Appointment,” *The Quarterly Journal of Economics*, vol. 108(1), pp. 185-218.

Chappell, H. W. and W. Keech (1986), “Party Differences in Macroeconomic Policies and Outcomes,” *American Economic Review,* vol. 76(2), pp. 71-74.

Clarida, R., J. Galí, and M. Gertler (2000), “Monetary Policy Rules And Macroeconomic Stability: Evidence And Some Theory,” *The Quarterly Journal of Economics*, vol. 115(1), pp. 147-180.

Corder, J. K. (2006), “Partisan politics and Fed policy choices: A Taylor rule approach,’’ Prepared for presentation at the Annual Meetings of the Midwest Political Science Association, pp. 1-21.

Cukierman, A., P. Kalaitzidakis, L. Summers, and S. B. Webb (1993), “Central bank independence, growth, investment, and real rates,” *Carnegie-Rochester Conference Series on Public Policy,* vol. 39 (1), pp. 95-140.

Cukierman, A. and A. H. Meltzer (1986), “A Theory of Ambiguity, Credibility, and Inflation under Discretion and Asymmetric Information,” *Econometrica*, vol. 54(5), pp. 1099-1128.

Cukierman, A., S. B. Webb, and B. Neyapti (1992), “Measuring the Independence of Central Banks and Its Effect on Policy Outcomes,” *World Bank Economic Review*, vol. 6(3), pp. 353-398.

Faust, J. and J. Irons (1999), “Money, politics and the post-war business cycle,” *Journal of Monetary Economics*, vol. 43(1), pp. 61-89.

Fischer, S. (1993), “The role of macroeconomic factors in growth,” *Journal of Monetary Economics*, vol. 32(3), pp. 485-512.

Grier, K. B. (1984), *The Political Economy of Monetary Policy*, doctoral dissertation. Department of Economics, Washington University, St. Louis, MO.

Grier, K. B. (1989), “On the Existence of a Political Monetary Cycle,” *American Journal of Political Science*, vol. 33(2), pp. 376-389.

Grilli, V., D. Masciandaro, G. Tabellini, M. Malinvaud, and M. Pagano (1991), “Political and Monetary Institutions and Public Financial Policies in the Industrial Countries,” *Economic Policy*, vol. 6(13), pp. 342-392.

Havrilesky, T. M. (1987), “A Partisanship Theory of Fiscal and Monetary Regimes,” *Journal of Money, Credit and Banking*, vol. 19(3), pp. 308-325.

Hayo, B. and C. Hefeker (2002), “Reconsidering central bank dependence,” *European Journal of Political Economy*, vol. 18(4), pp. 653-674.

Hibbs, D. (1987), “*The American political economy: Macroeconomics and electoral politics,”* Harvard university press, Cambridge MA.

Kalman, R. E. (1960), "A New Approach to Linear Filtering and Prediction Problems," *Journal of Basic Engineering*, vol. 82(1), pp. 35-45.

Kiewiet, D. R. and D. Rivers (1984), "A retrospective on retrospective voting," *Political behavior,* vol. 6(4), pp. 369-393.

Kim, C. J. and C. R. Nelson (2006), "Estimation of a forward-looking monetary policy rule: A time-varying parameter model using ex post data," *Journal of Monetary Economics*, vol. 53(8), pp. 1949-1966.

Kydland, F. E. and E. C. Prescott (1977), "Rules Rather Than Discretion: The Inconsistency of Optimal Plans," *Journal of Political Economy*, vol. 85(3), pp. 473-491.

McCallum, B. T. (1978), "The Political Business Cycle: An Empirical Test," *Southern Economic Journal*, vol. 44(3), pp. 504-515.

Nordhaus, W. D. (1975), "The Political Business Cycle," *Review of Economic Studies*, vol. 42(2), pp. 169-190.

Ravn, M. and H. Uhlig (2002), "On adjusting the Hodrick-Prescott filter for the frequency of observations," *The Review of Economics and Statistics*, vol.84(2), pp. 371-375.

Rogoff, K. (1985), "The Optimal Degree of Commitment to an Intermediate Monetary Target," *The Quarterly Journal of Economics*, vol. 100(4), pp. 1169-1189.

Rogoff, K. and A. Sibert (1988), "Elections and Macroeconomic Policy Cycles," *Review of Economic Studies*, vol. 55(1), pp. 1-16.

Rudebusch, G. D. (2002), "Term structure evidence on interest rate smoothing and monetary policy inertia," *Journal of Monetary Economics*, vol. 49(6), pp. 1161-1187.

Sack, B. and V. Wieland (2000), "Interest-rate smoothing and optimal monetary policy: a review of recent empirical evidence," *Journal of Economics and Business*, vol. 52(1 and 2), pp. 205-228.

Svensson, L. E. O. (2003), "What Is Wrong with Taylor Rules? Using Judgment in Monetary Policy through Targeting Rules," *Journal of Economic Literature,* vol. 41(2), pp. 426-477, June.

Taylor, J.B. (1993), "Discretion versus policy rules in practice," *Carnegie-Rochester Conference Series on Public Policy*, vol. 39(1), pp. 195-214.

Taylor, J.B. (2013), "The Effectiveness of Central Bank Independence vs. Policy Rules," Business Economics, vol. 48(3), pp. 155-162.

Temple, J. (2000), "Inflation and Growth: Stories Short and Tall," *Journal of Economic Surveys*, vol. 14(4), pp. 395-426.

Tempelman, J. H. (2007), "A commentary on 'Does the Fed contribute to a political business cycle?'," *Public Choice*, vol. 132(3), pp. 433-436.

Woodford, M. (1999), "Optimal Monetary Policy Inertia," Manchester School, University of Manchester, vol. 67(s1), pp. 1-35.

Appendix A. Data: definitions and sources

Table A1. *Series names, definitions, samples and sources.*

Series name	Description	Sample, units and frequency	Source
FFR	Effective Federal Funds Rate	1954M7-2013M6 (Monthly; Percent; Averages of Daily Figures; Not Seasonally Adjusted)	FRED (Federal Reserve Economic Data); Board of Governors of the Federal Reserve System
EXI	Median expected price change next 12 months	1978M1-2013M5 (Monthly; Percent; Not Seasonally Adjusted)	FRED; Thomson Reuters/University of Michigan
EXU	Median Forecast, 4-quarter ahead unemployment forecast (sequence of 5-step-ahead forecasts including current-quarter forecasts)	1968Q4-2013Q2 (Quarterly; Percentage points; Seasonally Adjusted)	Federal Reserve Bank of Philadelphia; Survey of Professional Forecasters
E	Election (0,1)-dummy: 1 in election month (November), 0 elsewhere	1954M7-2013M3	
B	Pre-election period (0,1)-dummy: 1's six months before elections, 0 elsewhere	1954M7-2013M3	
A	Post-election period (0,1)-dummy: 1's six months after elections, 0 elsewhere	1954M7-2013M3	
P	(0,1)-dummy: 1 for a Democrat; 0 for Republican	1954M7-2013M3	

Appendix B. Calculating trend unemployment

EXU is decomposed in a growth or trend component (EXUHP) and stationary residual or cyclical component using the Hodrick Prescott filter which we estimate by the maximum likelihood using the Kalman filter. The state space formulation is

$$y_t = \tau_t + c_t \quad \text{(B1)}$$

$$\tau_t = 2\tau_{t-1} - \tau_{t-2} + \varepsilon_t, \quad \text{(B2)}$$

where τ_t is the trend component and the cyclical component c_t has mean 0. The ratio of variances between c_t and ε_t is λ in the Hodrick Prescott filter function. We use as smoothing parameter λ = 129600. This is based on the frequency rule in Ravn-Uhlig (2002) with power=4. The variance of the residual noise term ε_t is lower if λ is higher.

Figure B1 shows expected unemployment (EXU) and the trend component from the smoothed Kalman filter (EXUHPF). The monthly cyclical component is calculated as EXU minus the smoothed state variable EXUHPF.

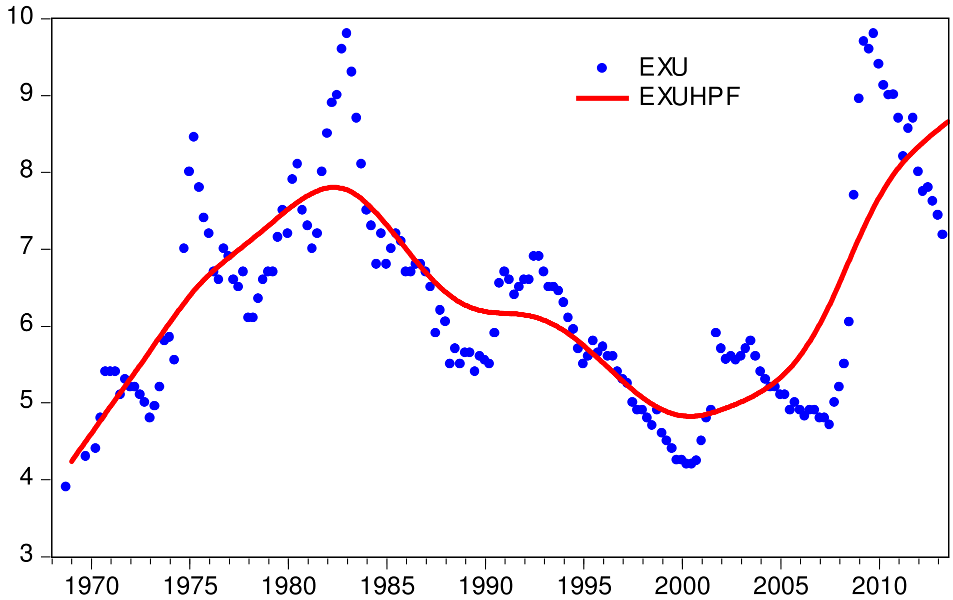

Figure B1. *The expected unemployment (EXU) and the trend component from the smoothed Kalman filter (EXUHPF) for the period 1969M01-2013M07.*

Appendix C. Dynamic forecasts

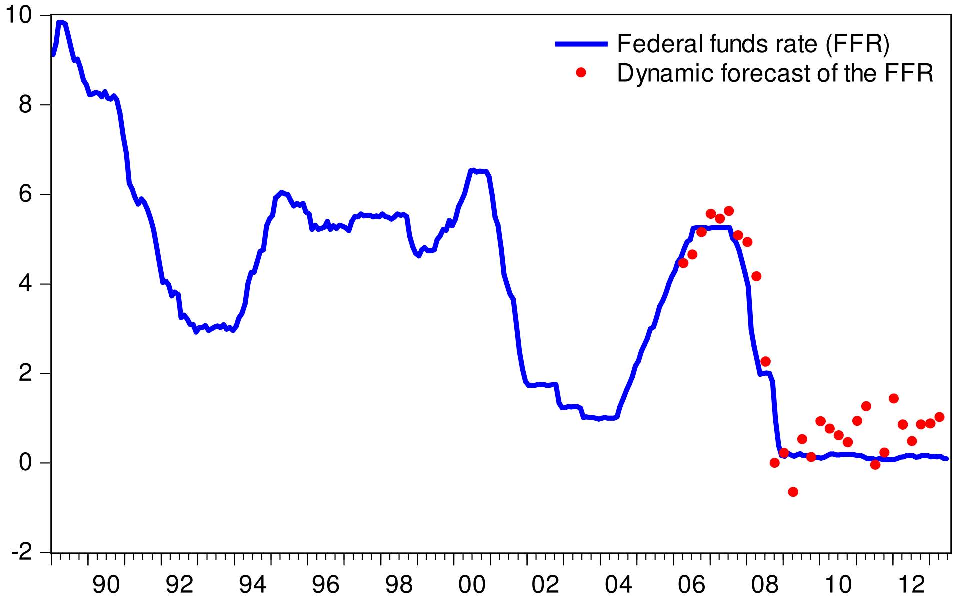

Figure C1. *Dynamic forecast for the period February 2006 to July 2013.*

List of research reports

12001-HRM&OB: Veltrop, D.B., C.L.M. Hermes, T.J.B.M. Postma and J. de Haan, A Tale of Two Factions: Exploring the Relationship between Factional Faultlines and Conflict Management in Pension Fund Boards

12002-EEF: Angelini, V. and J.O. Mierau, Social and Economic Aspects of Childhood Health: Evidence from Western-Europe

12003-Other: Valkenhoef, G.H.M. van, T. Tervonen, E.O. de Brock and H. Hillege, Clinical trials information in drug development and regulation: existing systems and standards

12004-EEF: Toolsema, L.A. and M.A. Allers, Welfare financing: Grant allocation and efficiency

12005-EEF: Boonman, T.M., J.P.A.M. Jacobs and G.H. Kuper, The Global Financial Crisis and currency crises in Latin America

12006-EEF: Kuper, G.H. and E. Sterken, Participation and Performance at the London 2012 Olympics

12007-Other: Zhao, J., G.H.M. van Valkenhoef, E.O. de Brock and H. Hillege, ADDIS: an automated way to do network meta-analysis

12008-GEM: Hoorn, A.A.J. van, Individualism and the cultural roots of management practices

12009-EEF: Dungey, M., J.P.A.M. Jacobs, J. Tian and S. van Norden, On trend-cycle decomposition and data revision

12010-EEF: Jong-A-Pin, R., J-E. Sturm and J. de Haan, Using real-time data to test for political budget cycles

12011-EEF: Samarina, A., Monetary targeting and financial system characteristics: An empirical analysis

12012-EEF: Alessie, R., V. Angelini and P. van Santen, Pension wealth and household savings in Europe: Evidence from SHARELIFE

13001-EEF: Kuper, G.H. and M. Mulder, Cross-border infrastructure constraints, regulatory measures and economic integration of the Dutch – German gas market

13002-EEF: Klein Goldewijk, G.M. and J.P.A.M. Jacobs, The relation between stature and long bone length in the Roman Empire

13003-EEF: Mulder, M. and L. Schoonbeek, Decomposing changes in competition in the Dutch electricity market through the Residual Supply Index

13004-EEF: Kuper, G.H. and M. Mulder, Cross-border constraints, institutional changes and integration of the Dutch – German gas market

13005-EEF: Wiese, R., Do political or economic factors drive healthcare financing privatisations? Empirical evidence from OECD countries

13006-EEF: Elhorst, J.P., P. Heijnen, A. Samarina and J.P.A.M. Jacobs, State transfers at different moments in time: A spatial probit approach

13007-EEF: Mierau, J.O., The activity and lethality of militant groups: Ideology, capacity, and environment

13008-EEF: Dijkstra, P.T., M.A. Haan and M. Mulder, The effect of industry structure and yardstick design on strategic behavior with yardstick competition: an experimental study

13009-GEM: Hoorn, A.A.J. van, Values of financial services professionals and the global financial crisis as a crisis of ethics

13010-EEF: Boonman, T.M., Sovereign defaults, business cycles and economic growth in Latin America, 1870-2012

13011-EEF: He, X., J.P.A.M Jacobs, G.H. Kuper and J.E. Ligthart, On the impact of the global financial crisis on the euro area

13012-GEM: Hoorn, A.A.J. van, Generational shifts in managerial values and the coming of a global business culture

13013-EEF: Samarina, A. and J.E. Sturm, Factors leading to inflation targeting – The impact of adoption

13014-EEF: Allers, M.A. and E. Merkus, Soft budget constraint but no moral hazard? The Dutch local government bailout puzzle

13015-GEM: Hoorn, A.A.J. van, Trust and management: Explaining cross-national differences in work autonomy

13016-EEF: Boonman, T.M., J.P.A.M. Jacobs and G.H. Kuper, Sovereign debt crises in Latin America: A market pressure approach

13017-GEM: Oosterhaven, J., M.C. Bouwmeester and M. Nozaki, The impact of production and infrastructure shocks: A non-linear input-output programming approach, tested on an hypothetical economy

13018-EEF: Cavapozzi, D., W. Han and R. Miniaci, Alternative weighting structures for multidimensional poverty assessment

14001-OPERA: Germs, R. and N.D. van Foreest, Optimal control of production-inventory systems with constant and compound poisson demand

14002-EEF: Bao, T. and J. Duffy, Adaptive vs. eductive learning: Theory and evidence

14003-OPERA: Syntetos, A.A. and R.H. Teunter, On the calculation of safety stocks

14004-EEF: Bouwmeester, M.C., J. Oosterhaven and J.M. Rueda-Cantuche, Measuring the EU value added embodied in EU foreign exports by consolidating 27 national supply and use tables for 2000-2007

14005-OPERA: Prak, D.R.J., R.H. Teunter and J. Riezebos, Periodic review and continuous ordering

14006-EEF: Reijnders, L.S.M., The college gender gap reversal: Insights from a life-cycle perspective

14007-EEF: Reijnders, L.S.M., Child care subsidies with endogenous education and fertility

14008-EEF: Otter, P.W., J.P.A.M. Jacobs and A.H.J. den Reijer, A criterion for the number of factors in a data-rich environment

14009-EEF: Mierau, J.O. and E. Suari Andreu, Fiscal rules and government size in the European Union

14010-EEF: Dijkstra, P.T., M.A. Haan and M. Mulder, Industry structure and collusion with uniform yardstick competition: theory and experiments

14011-EEF: Huizingh, E. and M. Mulder, Effectiveness of regulatory interventions on firm behavior: a randomized field experiment with e-commerce firms

14012-GEM: Bressand, A., Proving the old spell wrong: New African hydrocarbon producers and the 'resource curse'

14013-EEF: Dijkstra P.T., Price leadership and unequal market sharing: Collusion in experimental markets

14014-EEF: Angelini, V., M. Bertoni, and L. Corazzini, Unpacking the determinants of life satisfaction: A survey experiment

14015-EEF: Heijdra, B.J., J.O. Mierau, and T. Trimborn, Stimulating annuity markets

14016-GEM: Bezemer, D., M. Grydaki, and L. Zhang, Is Financial Development Bad for Growth?

14017-EEF: De Cao, E., and C. Lutz, Sensitive survey questions: Measuring attitudes regarding female circumcision through a list experiment

14018-EEF: De Cao, E., The height production function from birth to maturity

14019-EEF: Allers, M.A., and J.B. Geertsema, The effects of local government amalgamation on public spending and service levels. Evidence from 15 years of municipal boundary reform.

14020-EEF: Kuper, G.H., and J.H. Veurink, Central bank independence and political pressure in the Greenspan era.

www.rug.nl/feb